

Remarks

Favorable review is requested in view of the above amendments and following remarks. Editorial amendments have been made to claims 1 - 2, 4 - 7, and 11. Claims 12 - 15 have been added and are supported for example, at page 36, line 12 - page 37, line 8 and Table 2; page 24, lines 1 - 17 and Figure 5; page 24, lines 18 - 21; and page 25, lines 14 - 18 of the specification, respectively. The method used to identify the features claimed in claim 12 can be found on page 36, line 12 - page 37, line 8 of the specification. No new matter has been added. Claims 1 - 15 remain pending in the application.

Rejection under 35 U.S.C. § 112

Claims 1 - 11 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Applicants respectfully traverse this rejection.

Claim 1 and the corresponding relevant claims have been amended for editorial purposes. Claims 2 - 11 depend from claim 1. Applicants believe that the claims comply with 35 U.S.C. § 112, and request favorable reconsideration. Withdrawal of the rejection is requested.

Rejection under 35 U.S.C. § 103

Claims 1 - 5, 10, and 11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 4 - 45811 in view of Pike et al. (U.S. Patent 6,090,731). Applicants respectfully traverse this rejection, and respectfully request reconsideration in view of the following comments.

JP '811 discloses a filter cartridge prepared by winding a non-woven fabric around a perforated cylinder in which the non-woven fabric comprises a divided staple fiber. However, the filter cartridge of the present claimed invention comprises a continuous fiber non-woven fabric. The filter cartridge described for Comparative Example 3 of the present application (see page 46 of the specification) is analogous to that of JP '811. The initial trapped particle diameters of Comparative Example 3 and Example 20 are 10.1 and 10.0 μm , respectively, which are almost identical. See Table 2 of the specification. However, the initial pressure loss, trapped particle diameter in 0.2 MPa, and filter life of Comparative Example 3 are 0.010 MPa, 13 μm , and 80 minutes, respectively. Whereas, the initial pressure loss, trapped particle diameter in 0.2

MPa, and filter life of Example 20 are 0.003 MPa, 10 μ m, and 225 minutes, respectively. These characteristics represent unexpected results, and unexpected results can rebut prima facie obviousness. See MPEP § 716.02(a). Therefore, the claimed invention is patentable over JP '811 in view of Pike et al. Withdrawal of the rejection is requested.

In addition, a comparative experiment was performed between the filter cartridges used for examples 4 and 11 of the present invention and that of Pike et al. The results and experimentation are explained in detail in the attached YAMAGUCHI Declaration. In summary, the filter life of the present invention was much longer than that of Pike et al, which is an unexpected result. Therefore, the claimed invention is patentable over JP '811 in view of Pike et al. Withdrawal of the rejection is requested.

Furthermore, the filter medium of Pike et al. is that of sheet non-woven medium. See column 3, lines 58 - 61 of Pike et al. This corresponds to surface filtration, also called surface straining. See page 51 of the Filters and Filtration Handbook, enclosed. However, JP '811 corresponds to depth filtration, not surface filtration. The mechanism of depth filtration is very complex as compared to surface filtration. See page 55 of the Filters and Filtration Handbook. Therefore, there is no suggestion or motivation that the two references would be combined. Consequently, the claimed invention is patentable over JP '811 in view of Pike et al. Withdrawal of the rejection is requested.

Claims 7 - 9 were rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 4 - 45811 in view of Pike et al. and further in view of JP 1 - 115423. Applicants respectfully traverse this rejection, and respectfully request reconsideration in view of the following comments.

JP 4 - 45811 and Pike et al. are distinguished above as failing to describe or suggest a filter cartridge that is made from a continuous fiber non-woven thermoplastic fabric. JP 1 - 115423 is relied upon to suggest pleating. Even if it does, which is not being conceded, this reference fails to remedy the noted shortcomings of the other references. Thus, withdrawal of the rejection is requested.

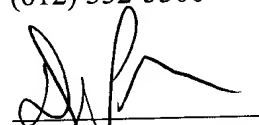
Conclusion

In view of the amendments and comments presented herein, favorable reconsideration in the form of a Notice of Allowance is respectfully requested. If any further questions should arise, the Examiner is invited to contact Applicant's representative at the number listed below.

Respectfully submitted,

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Version with Markings to Show Changes MadeIn the Claims

Please amend claims 1 - 2, 4 - 7, and 11 and add claims 12 - 15, as indicated herein.

1. (Twice amended) A filter cartridge comprising a strip, continuous [long] fiber non-woven fabric prepared using a spun bonding method, the fabric comprising a thermoplastic fiber in which at least a part of fiber intersections is thermally adhered, wherein the strip, continuous [long] fiber non-woven fabric is wound around a perforated cylinder in a twill form.

2. (Amended) The filter cartridge as described in claim 1, wherein the thermoplastic fiber constituting the continuous [long] fiber non-woven fabric is a thermally adhesive composite fiber comprising a low melting point resin and a high melting point resin, the difference in a melting point of both the resins being 10°C or more.

4. (Amended) The filter cartridge as described in claim 1, wherein the continuous [long] fiber non-woven fabric is bonded by thermal compression by means of a heat embossing roll.

5. (Amended) The filter cartridge as described in claim 2, wherein the fiber intersections of the continuous [long] fiber non-woven fabric are bonded by hot blast.

6. (Amended) The filter cartridge as described in claim 1, wherein the strip, continuous [long] fiber non-woven fabric is twisted.

7. (Amended) The filter cartridge as described in claim 1, wherein the strip, continuous [long] fiber non-woven fabric is formed into a pleated matter having 4 to 50 pleats and wound around a perforated cylinder in a twill form.

11. (Amended) The filter cartridge as described in claim 1, wherein the continuous [long] fiber non-woven fabric has a slit width of 0.5 cm or more, and a product of the slit width (cm) and the basis weight (g/m^2) is 200 or less.

12. (New) The filter cartridge as described in claim 1, wherein the filter cartridge has a ratio of trapped particle diameter in 0.2 MPa/initial trapped particle diameter being 1-1.13 when initial trapped particle diameter is 7.1 to 30 μm .

13. (New) A process for preparing a filter cartridge, wherein a strip, continuous fiber non-woven fabric comprising a thermoplastic fiber, prepared by a spun bonding method in which at least a part of the fiber intersections is thermally adhered, is converged, and then wound around a perforated cylinder in a twill form.

14. (New) A process for preparing a filter cartridge, wherein a strip, continuous fiber non-woven fabric comprising a thermoplastic fiber, prepared by a spun bonding method in which at least a part of the fiber intersections is thermally adhered, is pre-molded by means of a pleat-forming guide to be processed into a pleated matter, and then wound around a perforated cylinder in a twill form.

15. (New) A process for preparing a filter cartridge as described in claim 14, wherein the non-woven fabric is converged in such manner that the cross-sectional form of the pleated matter produced through the guide shows no parallel pleats.